RADIO TEST REPORT

For

Shenzhen Gaitewan Technology Co., Ltd..

Product Name:	Remote Controller
Model :	**Y4**
Series Model:	Y1,Y2,Y3,Y4,Y5,Y6,Y7,Y8,Y9,Y10,Y11,Y12,Y13,Y14,Y15
FCC ID:	2AIQU-Y4
Prepared By :	Shenzhen BST Technology Co., Ltd. Building No.23-24, Zhiheng Industrial Park, Guankouer Road, Nantou,Nanshan District,Shenzhen,Guangdong,China
Test Date:	Jun10-22, 2017
Date of Report :	Jun22, 2017
Test Result	pass
Report No.:	BST1707752820002Y-ER-1

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:Shenzhen Gaitewan Technology Co., Ltd.
Address of applicant:
501B, Bike Technology Mansion, No. 9,Keyan Road, High-tech Park,
Yuehai Str.Nanshan Dist, Shenzhen, Guangdong 518000 CHINA
Manufacturer:Shenzhen Gaitewan Technology Co., Ltd.
Address of manufacturer:501B, Bike Technology Mansion, No. 9,Keyan Road,
High-tech Park, Yuehai Str.Nanshan Dist, Shenzhen, Guangdong 518000 CHINA

General Description of EUT	
Product Name:	Remote Controller
Trade Name:	METAKOO
Model No.:	**Y4**
Adding Model(s):	Y1,Y2,Y3,Y4,Y5,Y6,Y7,Y8,Y9,Y10,Y11,Y12,Y13,Y14,Y15
Rated Voltage:	6V
Power Adapter Model:	N/A
Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model **Y4**, *but the circuit and the electronic construction do not change, declared by the manufacturer.*	

Technical Characteristics of EUT	
Frequency Range:	2420-2465Mhz
Max. Field Strength:	67.32
Modulation:	FSK
Quantity of Channels:	45
Channel Separation:	1
Antenna Type:	PCB
Antenna Gain:	1
Lowest Internal Frequency of EUT:	16MHZ

1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Gaitewan Technology Co., Ltd. in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107,15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

Shenzhen Asia Test Technology Co.,Ltd.
7 / F, Xinwei Building, Gushu Village, Xixiang Town, Baoan District, Shenzhen, China
FCC Registration No.: 348715; IC Registration No.: 12198A

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	2420MHz
TM2	Middle Channel	2445MHz
TM3	High Channel	2465MHz

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	±2.88dB
Transmitter Spurious Emissions	Radiated	±5.1dB

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2017-06-03	2018-06-03
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2017-06-03	2018-06-03
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2017-06-03	2018-06-03
Amplifier	Agilent	8447F	3113A06717	2017-06-03	2018-06-03
Amplifier	C&D	PAP-1G18	2002	2017-06-03	2018-06-03
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-03	2018-06-03
Horn Antenna	ETS	3117	00086197	2017-06-03	2018-06-03
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2017-06-03	2018-06-03
Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-03	2018-06-03
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2017-06-03	2018-06-03
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2017-06-03	2018-06-03
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2017-06-03	2018-06-03

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.209(a)(f)	Radiated Spurious Emissions	Compliant
§15.249(a)	Field Strength of Emissions	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.215 (c)	Emission Bandwidth	Compliant

3. Antenna Requirements

3.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has an integral antenna, fulfill the requirement of this section.

4. Radiated Emissions

4.1 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

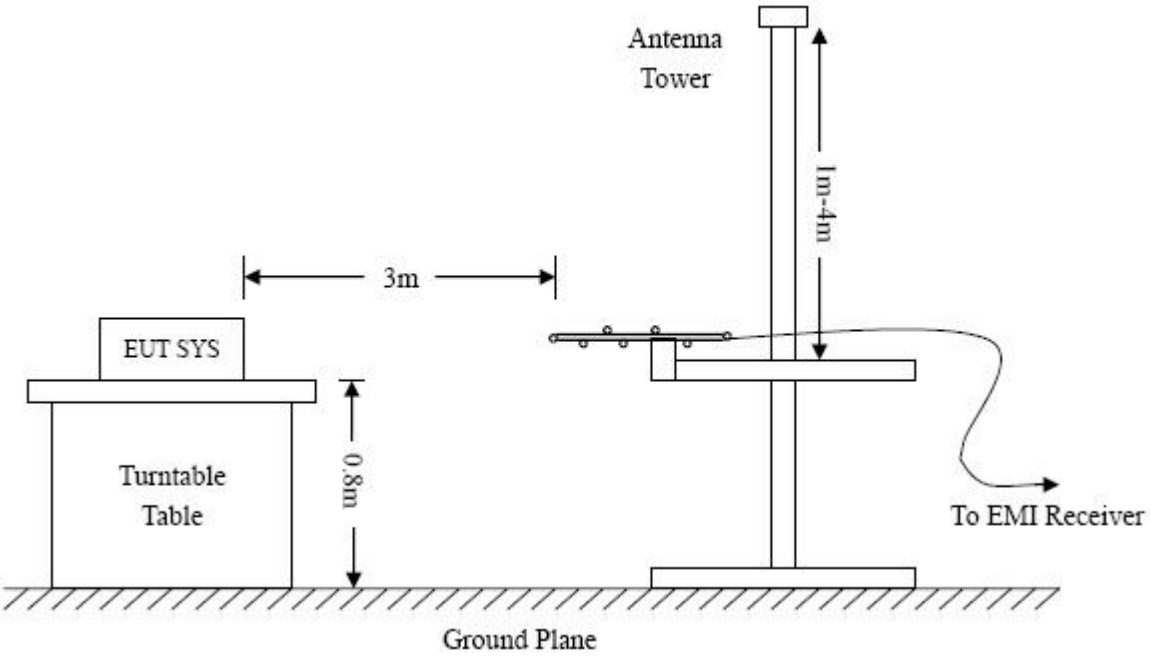
Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of Harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

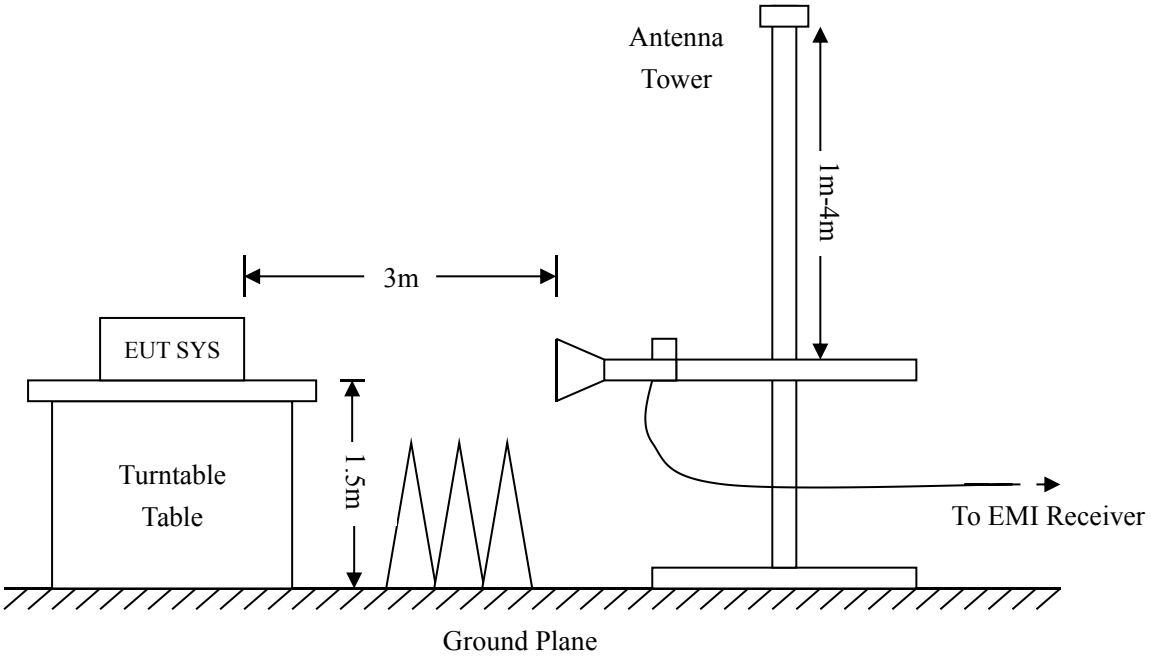
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

4.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.





Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15C Limit

4.4 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

4.5 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

-5.66 dB at **887.6099 MHz** in the **Horizontal** polarization, **Middle Channel of Antenna 1, 9 kHz to 25 GHz, 3Meters**

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

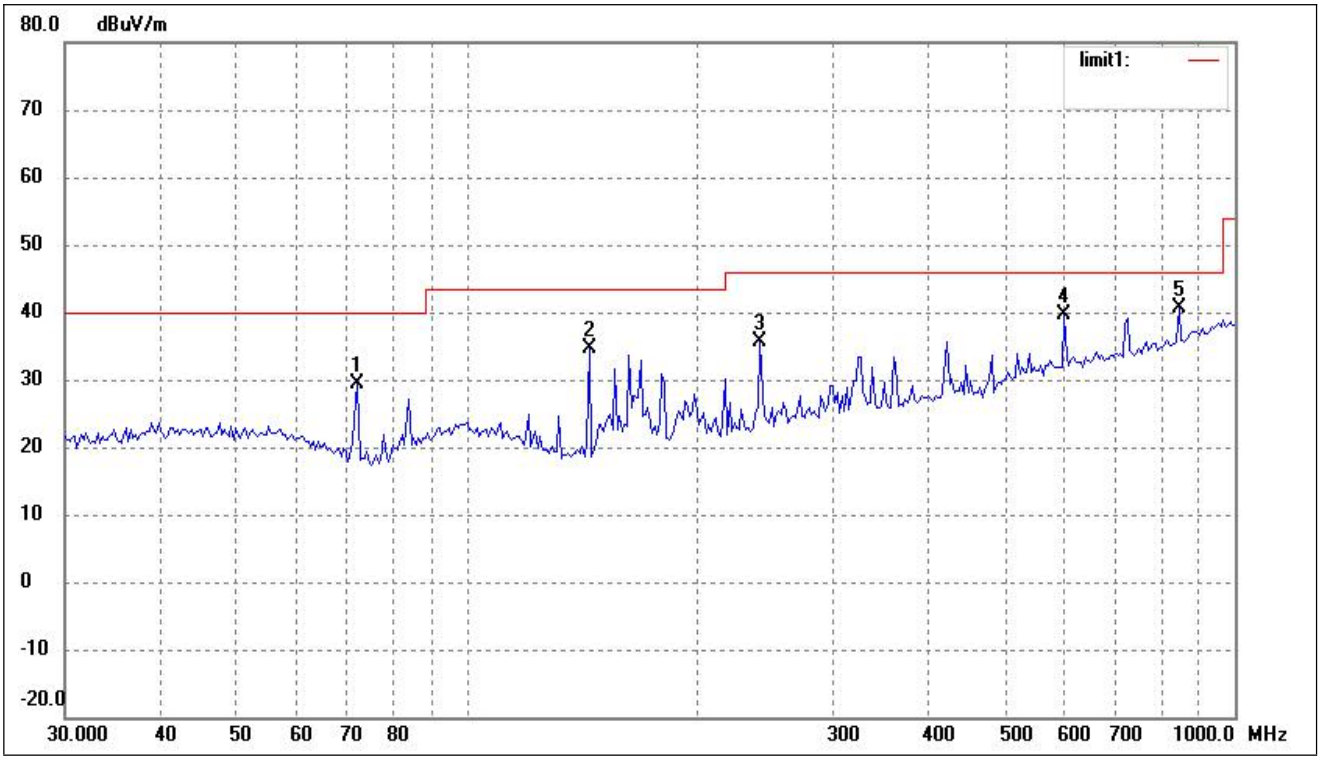
EUT:

Tested Model:

Operating Condition: *Transmitting Low Channel (2420MHz)*

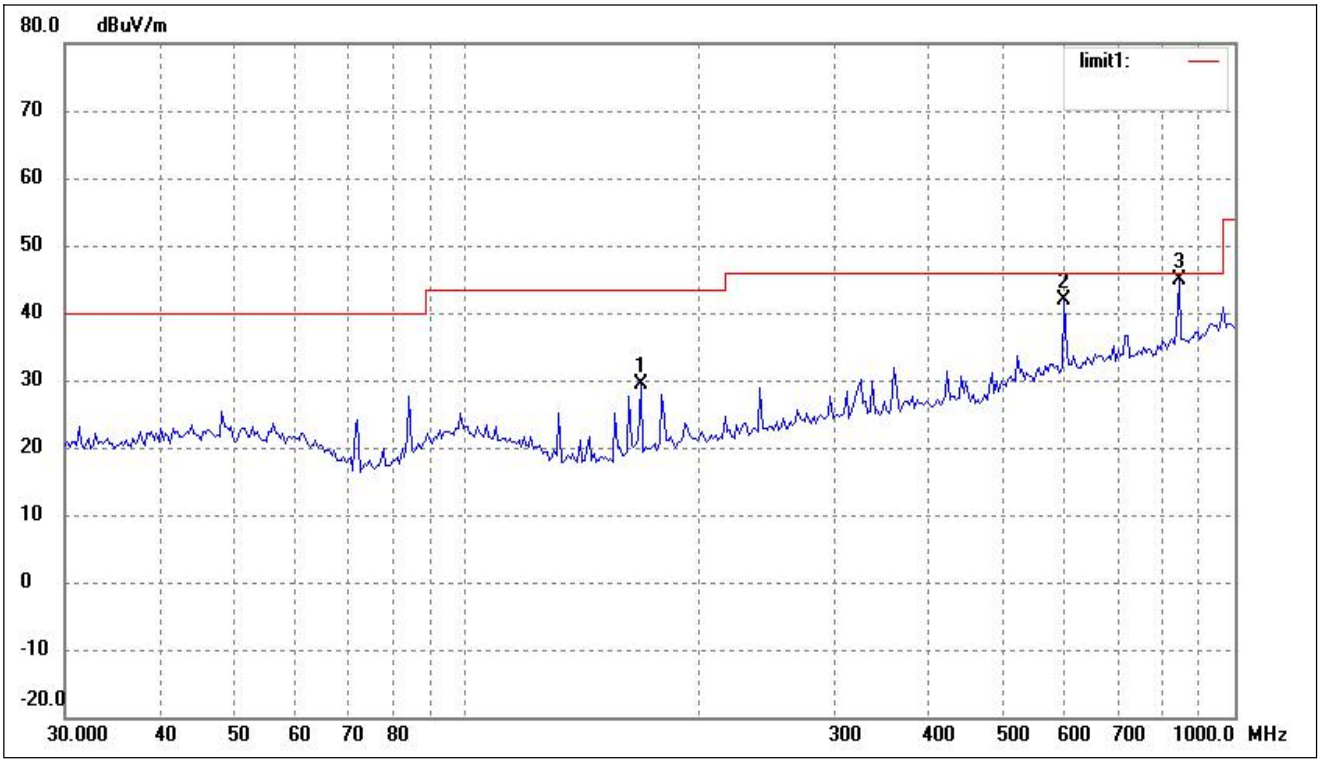
Comment:

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	72.0843	25.98	3.30	29.28	40.00	-10.72	264	100	peak
2	144.3348	30.56	4.01	34.57	43.50	-8.93	113	200	peak
3	240.8304	27.14	8.45	35.59	46.00	-10.41	287	100	peak
4	599.3212	22.95	16.65	39.60	46.00	-6.40	185	200	peak
5	845.0878	20.85	19.86	40.71	46.00	-5.29	110	100	QP

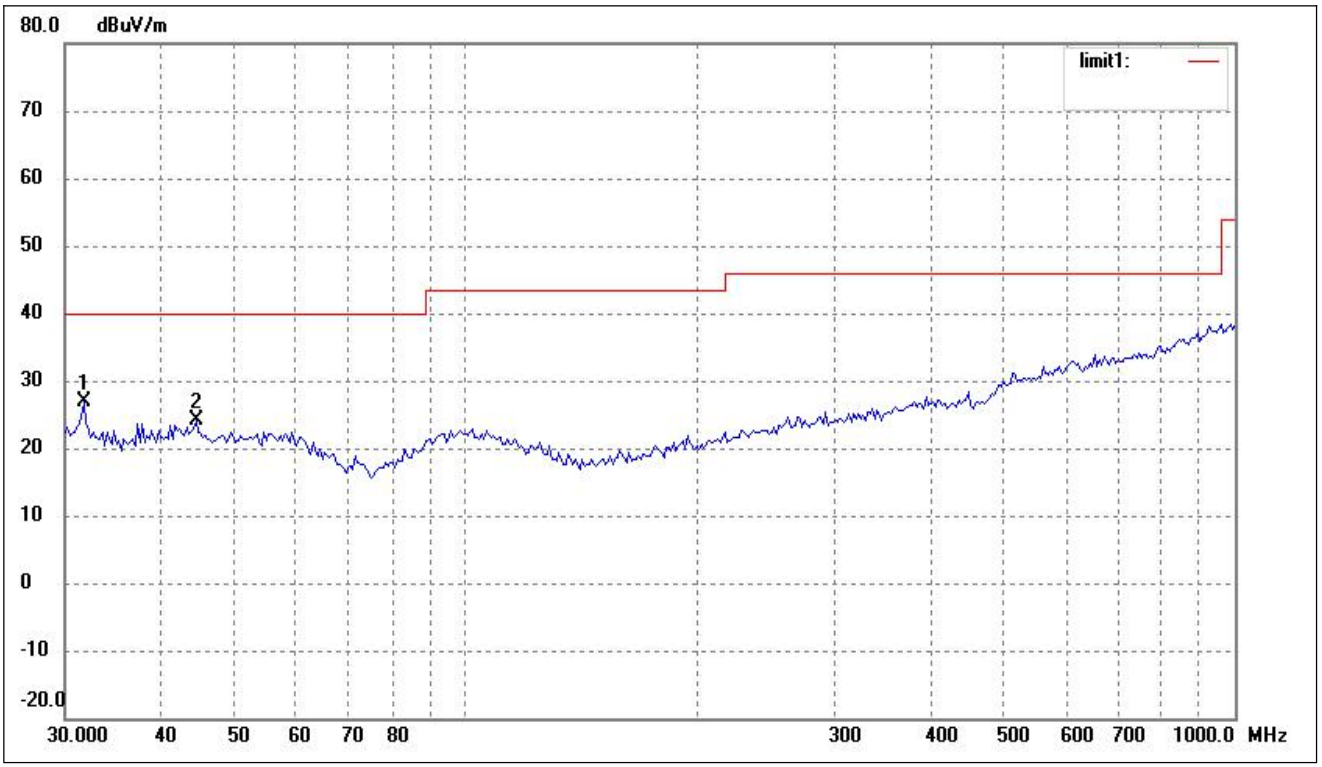
Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	168.4138	24.56	4.84	29.40	43.50	-14.10	234	100	peak
2	599.3212	25.21	16.65	41.86	46.00	-4.14	118	100	QP
3	845.0878	24.98	19.86	44.84	46.00	-1.16	164	100	QP

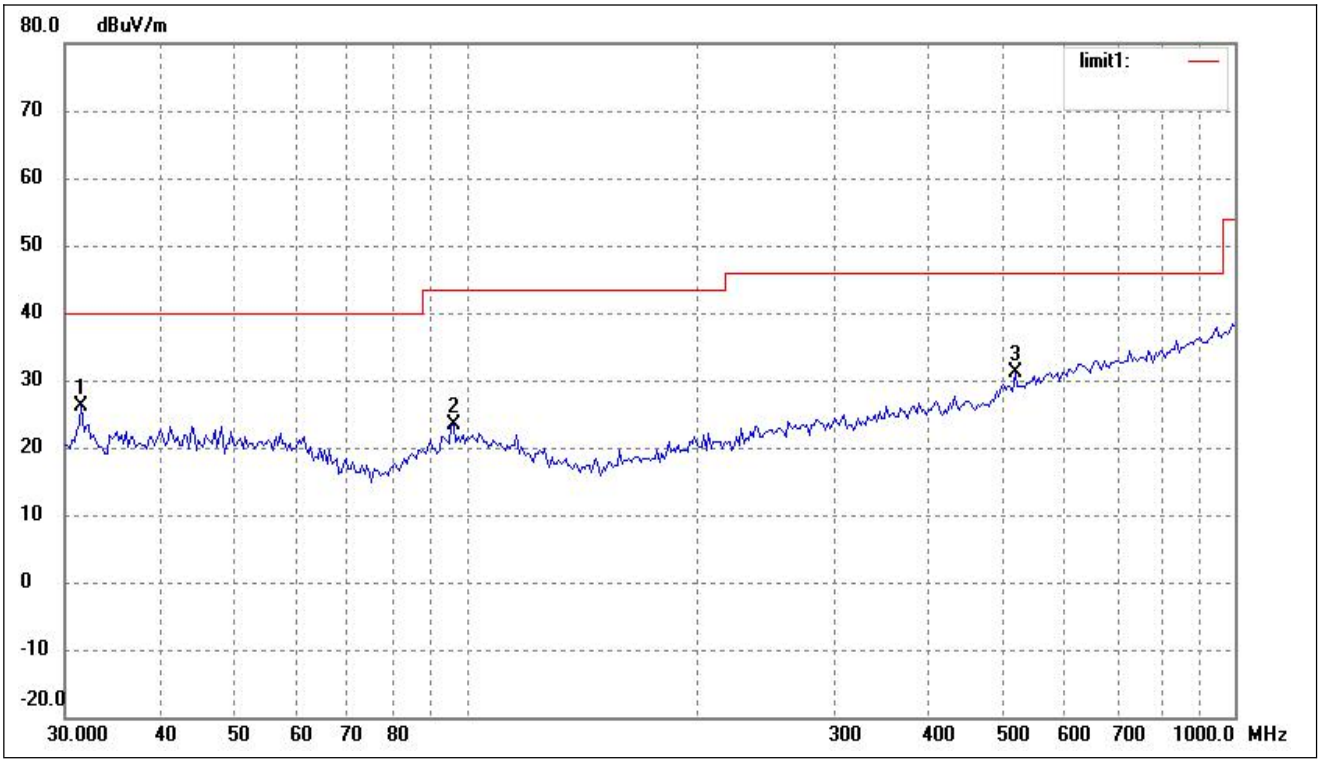
Operating Condition: *Transmitting Middle Channel (2445MHz)*
Comment:

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	31.7313	20.09	6.77	26.86	40.00	-13.14	162	100	peak
2	44.4308	15.81	8.22	24.03	40.00	-15.97	200	100	peak

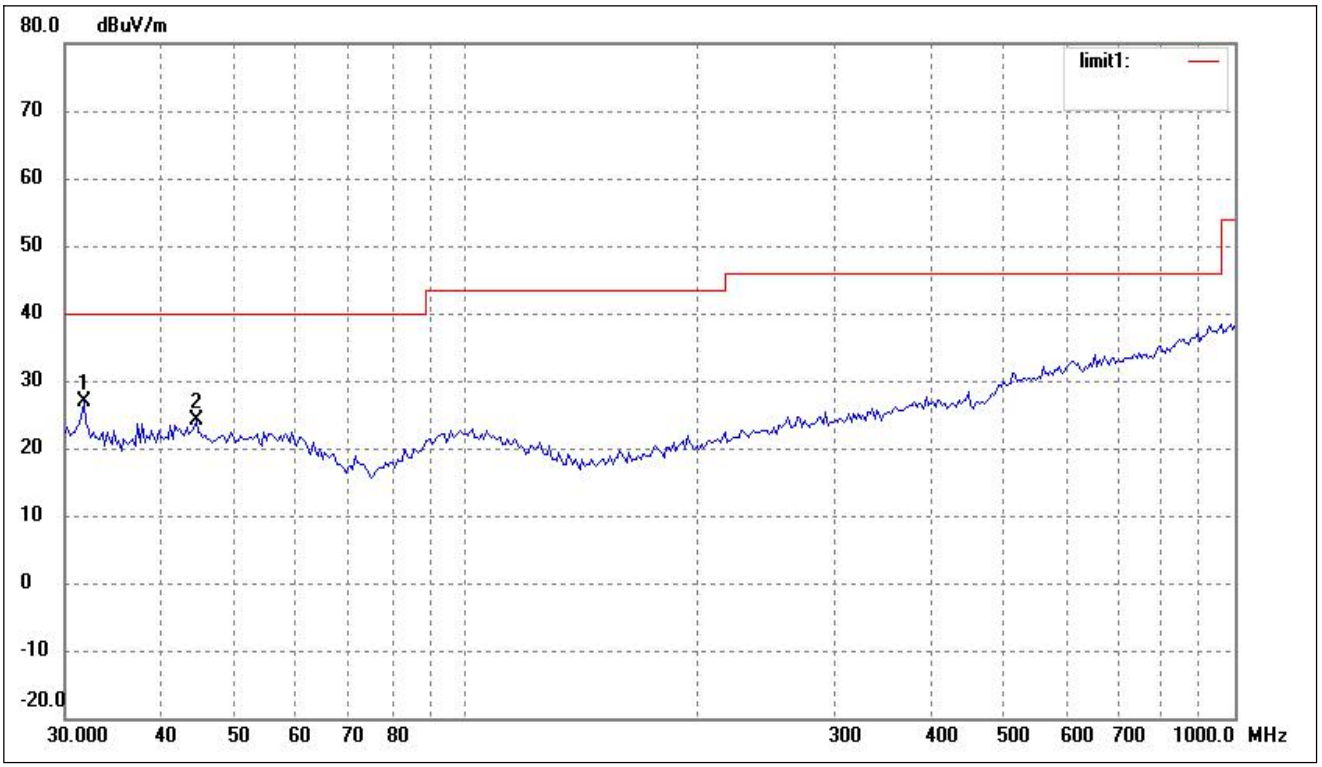
Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	31.5095	19.46	6.77	26.23	40.00	-13.77	240	100	peak
2	96.0986	15.12	8.14	23.26	43.50	-20.24	187	100	peak
3	517.2480	16.25	14.80	31.05	46.00	-14.95	220	100	peak

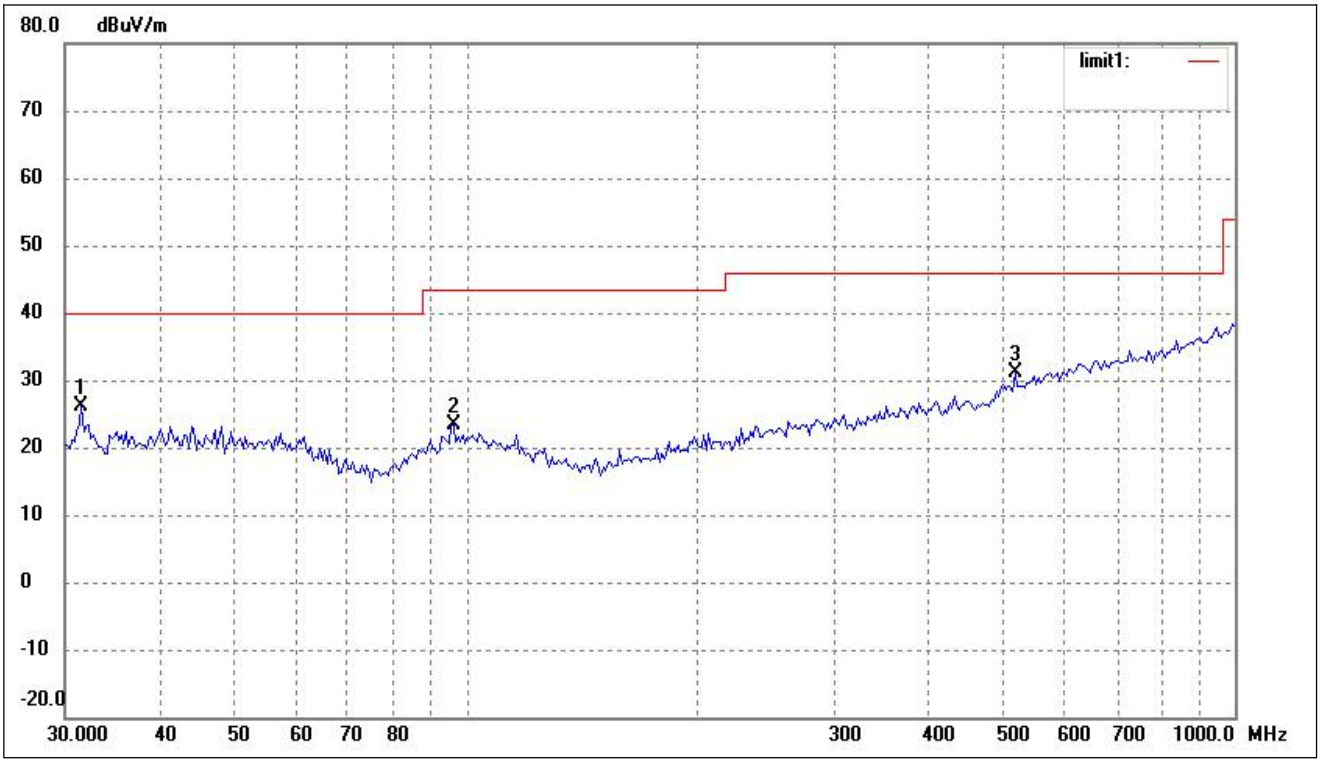
Operating Condition: *Transmitting High Channel (2465MHz)*
Comment:

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	31.7313	20.09	6.77	26.86	40.00	-13.14	162	100	peak
2	44.4308	15.81	8.22	24.03	40.00	-15.97	200	100	peak

Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	31.5095	19.46	6.77	26.23	40.00	-13.77	240	100	peak
2	96.0986	15.12	8.14	23.26	43.50	-20.24	187	100	peak
3	517.2480	16.25	14.80	31.05	46.00	-14.95	220	100	peak

Spurious Emissions Above 1GHz(Low channel)

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2420MHz							
2420	70.45	-3.58	66.87	114	47.13	H	PK
2420	54.91	-3.59	51.32	94	42.68	H	AV
4840	46.36	-0.51	45.85	74	28.15	H	PK
4840	33.45	-0.51	32.94	54	21.06	H	AV
7260	53.01	-0.51	52.5	74	21.5	H	PK
7260	35.87	-0.51	35.36	54	18.64	H	AV
2420	70.9	-3.58	67.32	114	46.68	V	PK
2420	55.93	-3.59	52.34	94	41.66	V	AV
4840	52.35	-0.51	51.84	74	22.16	V	PK
4840	31.42	-0.51	30.91	54	23.09	V	AV
7260	52.63	-0.51	52.12	74	21.88	V	PK
7260	33.25	-0.51	32.74	54	21.26	V	AV

Note:1. Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
The measurements greater than 20dB below the limit from 9kHz to 30MHz..
2. We pre-test all modes,and the worst data is low channel.

5. Out of Band Emissions

5.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

5.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

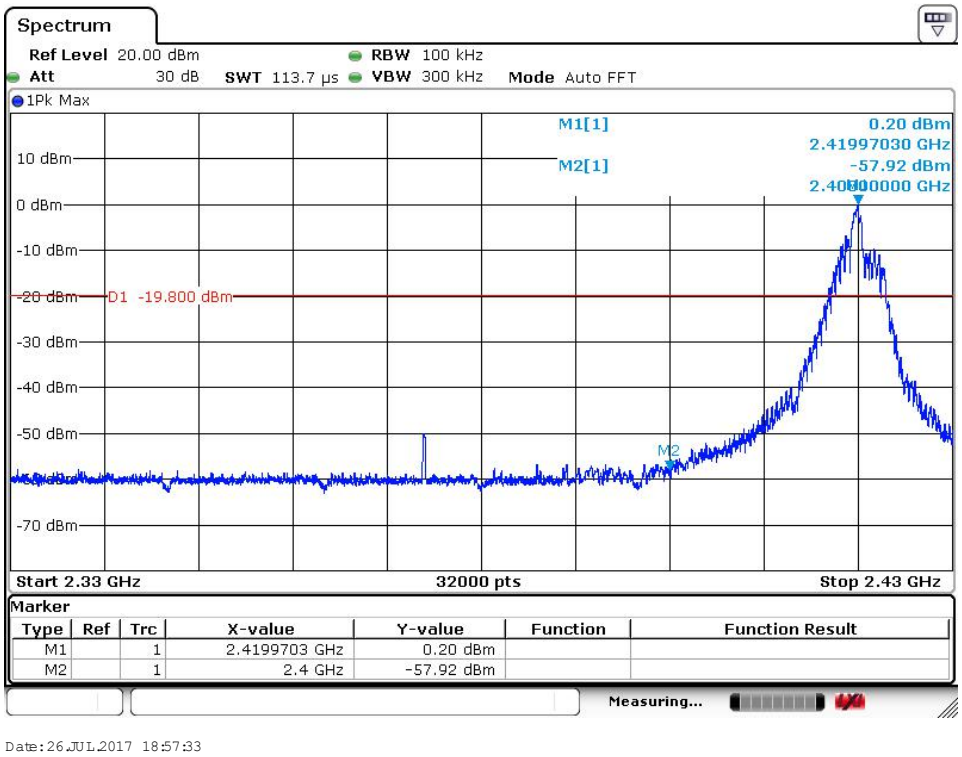
5.4 Summary of Test Results/Plots

Test mode	Frequency	Result	Limit	Polarization direction	Result
	MHz	dBuV	dBuV / dBc		
Lowest	2400.00	35.6	<54 dBuV	H	Pass
	2400.00	34.1	<54 dBuV	V	Pass
Highest	2483.50	36.2	<54 dBuV	H	Pass
	2483.50	35.5	<54 dBuV	V	Pass

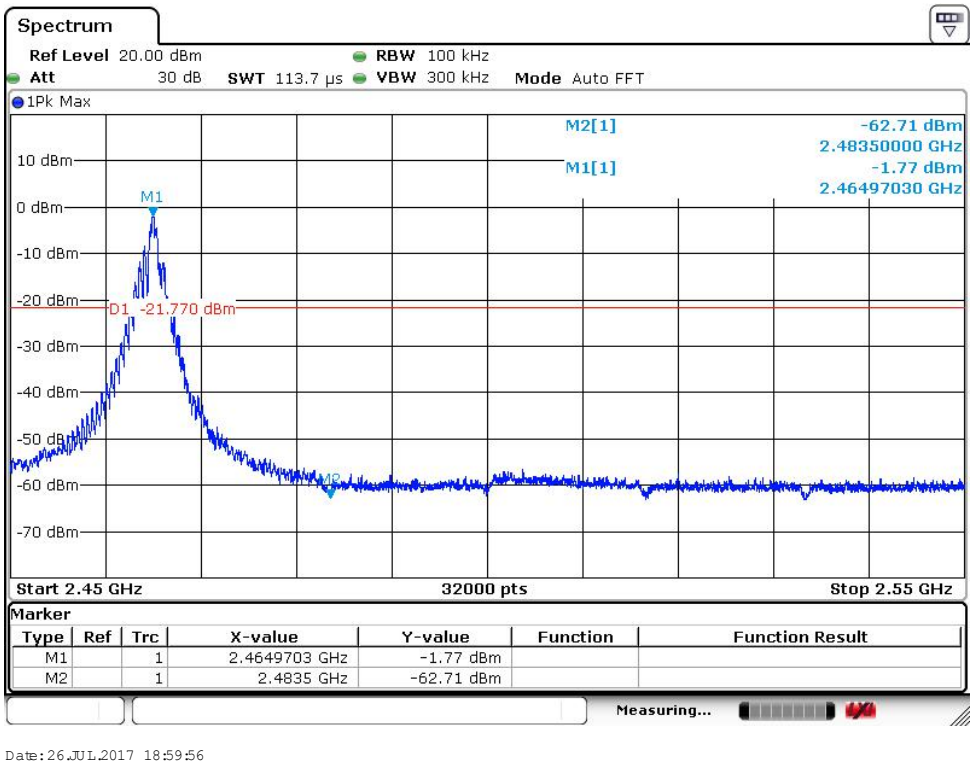
The edge emissions are below the FCC 15.209 Limits or complies with the 15.249 requirements.

Please refer to the test plots as below.

Low


Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 113.7 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1] 0.20 dBm 2.41997030 GHz
M2[1] -57.92 dBm 2.40000000 GHz
D1 -19.800 dBm
Start 2.33 GHz
32000 pts
Stop 2.43 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4199703 GHz 0.20 dBm
M2 1 2.4 GHz -57.92 dBm
Measuring...
Date:26.JUL.2017 18:57:33

high


Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 113.7 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M2[1] -62.71 dBm 2.48350000 GHz
M1[1] -1.77 dBm 2.46497030 GHz
D1 -21.770 dBm
Start 2.45 GHz
32000 pts
Stop 2.55 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4649703 GHz -1.77 dBm
M2 1 2.4835 GHz -62.71 dBm
Measuring...
Date:26.JUL.2017 18:59:56

6. Emission Bandwidth

6.1 Standard Applicable

According to 15.215 (c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2 Test Procedure

According to the ANSI 63.10-2013, the emission bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Set span = 1MHz, centered on a transmitting channel
RBW ≥1% 20dB Bandwidth, VBW ≥RBW
Sweep = auto
Detector function = peak
Trace = max hold
All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.

6.3 Environmental Conditions

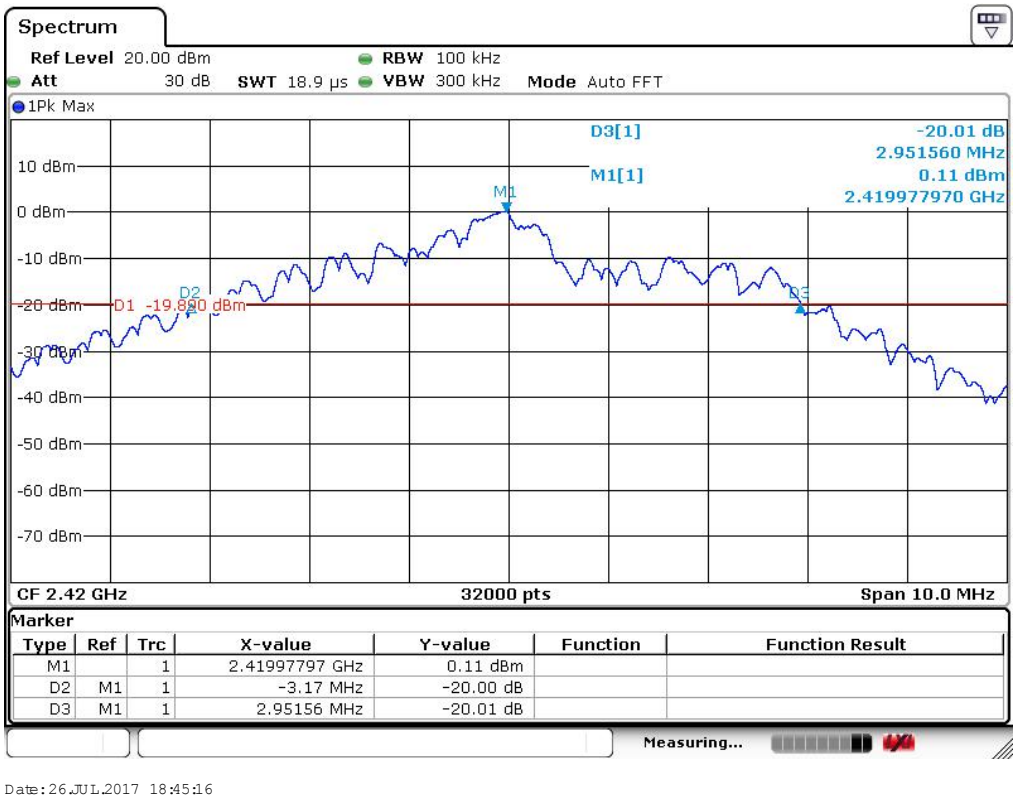
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.4 Summary of Test Results/Plots

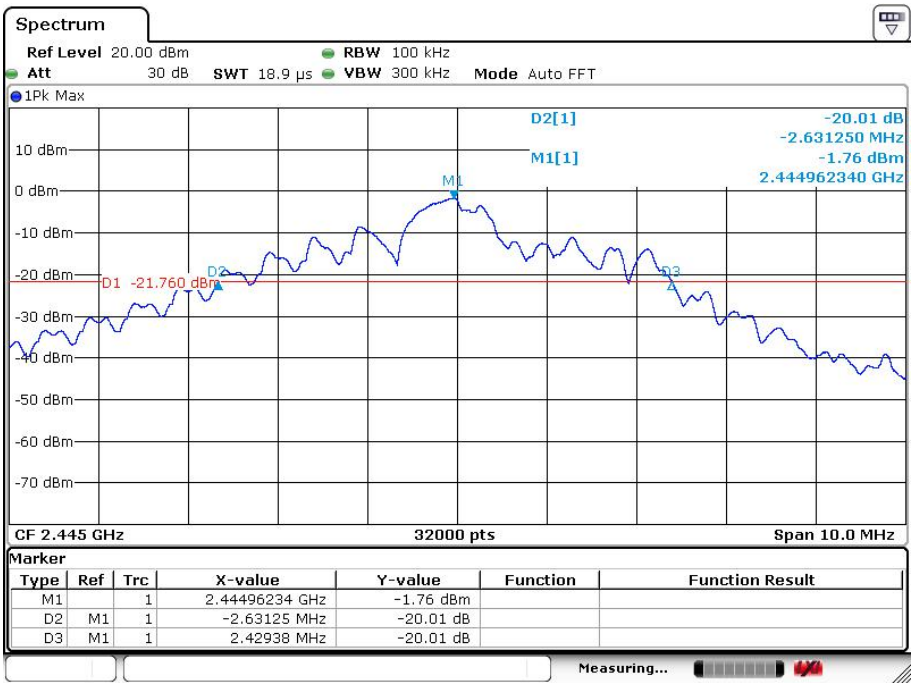
Channel	Frequency MHz	20dB Bandwidth kHz
Low Channel	2420	29516
Middle Channel	2445	24293
High Channel	2465	22062

Please refer to the following test plots

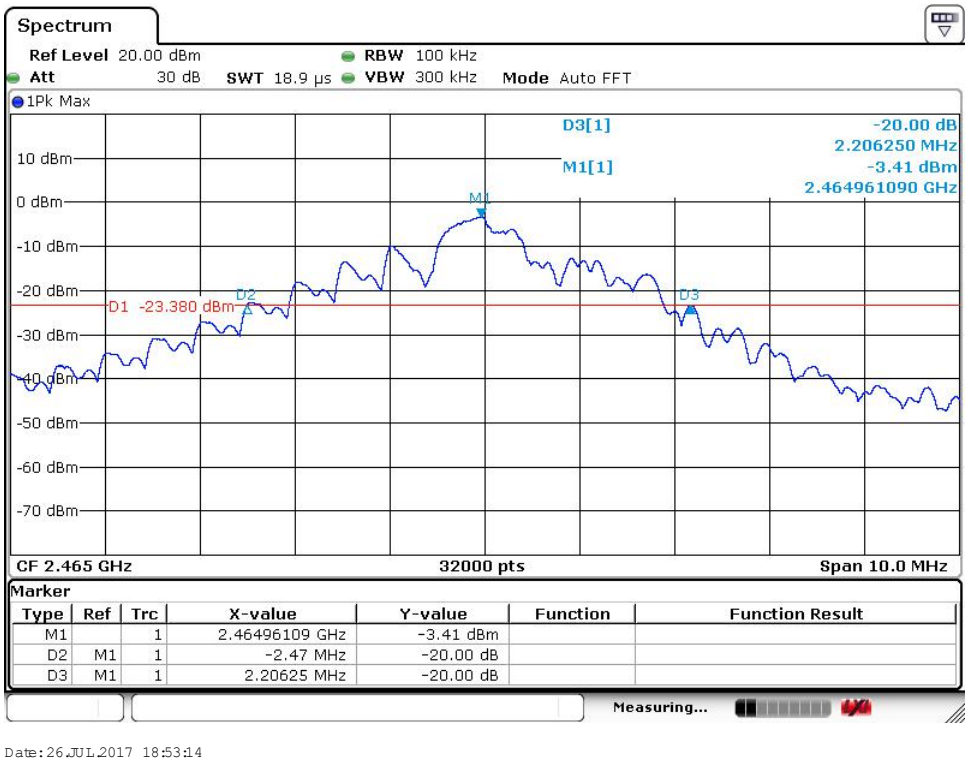
Low Channel:



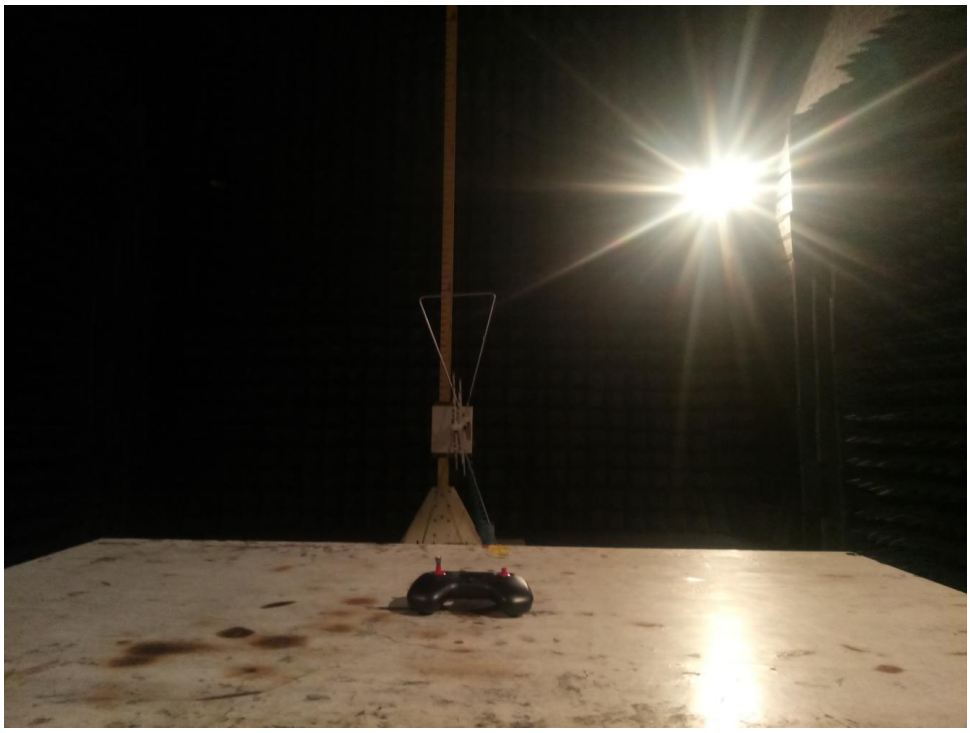
Middle Channel:

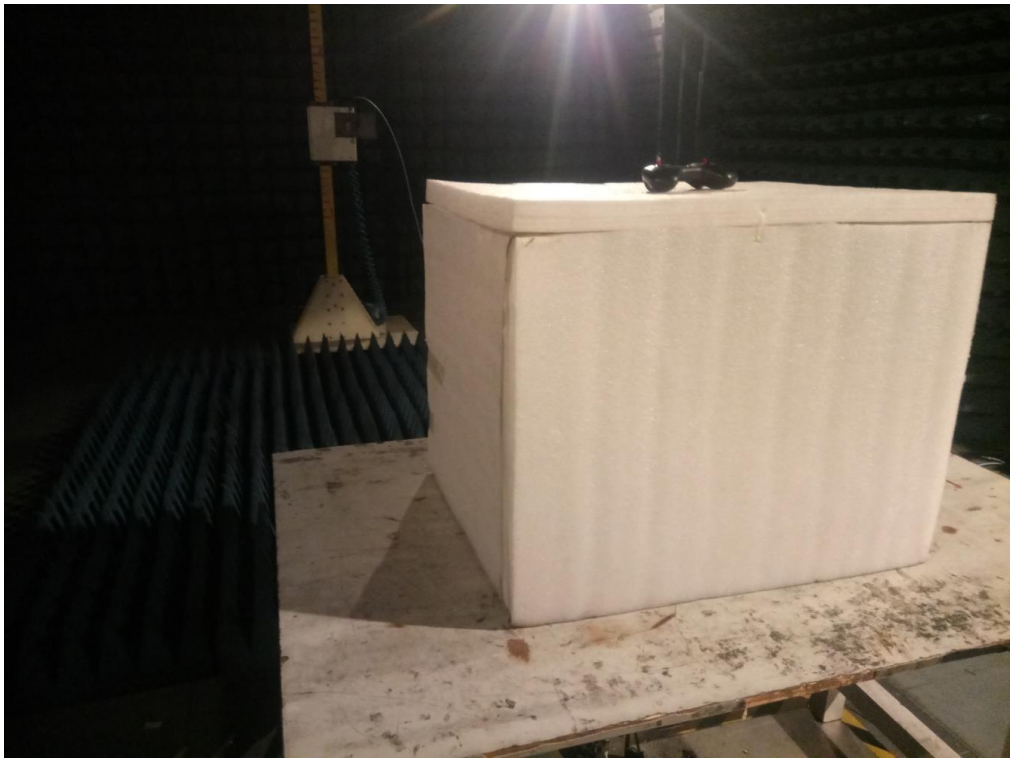


Middle Channel:



7,Test Photo





******* END OF REPORT *******